

## **Remarks**

### **The claimed invention**

The present invention includes a light-emitting device that includes a population of quantum dots (QDs) disposed in a host matrix. The QDs photoluminesce light in a color characteristic of their size, size distribution, and/or composition. The invention also includes a composition comprising a population of QDs disposed in a host matrix, and a method of producing light of a selected color by illuminating a population of QDs disposed in a host matrix.

### **Allowable subject matter**

Applicants thank Examiner Tran for the indication that claims 48, 50, 51, 53-55, and 62-67 contain allowable subject matter. Claims 48, 53, 62, and 65 have been amended with this response to place them in independent form. Applicants believe that these amendments remove all objections to these claims, and respectfully requests that they be allowed.

### **Rejections under 35 U.S.C. § 102**

Claims 1-4, 7-9, 13, 14, 27, 28, 30, 31, 35-39, 44, 46, 47, 49, 52, 56, 61, 68 and 69 stand rejected under 35 U.S.C. § 102(b) as anticipated by Hakimi. This rejection is respectfully traversed for the reasons set forth below.

As amended, independent claim 1, from which claims 2-4, 7-9, 13, and 14 depend, recites a primary light source and a population of QDs disposed in a host matrix. The matrix is in optical communication with the light source and is disposed so as to allow light to pass therethrough, thereby causing the QDs to photoluminesce. Both primary and secondary light may pass through the matrix.

Hakimi describes a quantum dot laser, in which quantum dots are irradiated by a pumping source such as an argon ion laser. Partially reflective mirrors largely contain the laser light within the lasing compartment so that a population inversion can be achieved, allowing the quantum dots to lase.

The laser system described by Hakimi does not “allow the light to pass” through the matrix in the sense of that phrase as recited in claim 1. The device of the present invention

allows both primary and secondary light to freely pass through the matrix material and out of the device. In Hakimi, the light is contained by mirrors and must stay in the device for many “rebounds,” so that lasing can occur, rather than passing “through” the device as recited in claim 1. For at least this reason, Applicants respectfully submit that Hakimi does not anticipate claims 1-4, 7-9, 13, and 14. Reconsideration and withdrawal of the rejection is therefore requested.

Independent claim 27, from which claims 28, 30, 31, and 35 depend directly or indirectly, recites a population of QDs dispersed in a host matrix, where the QDs are selected to photoluminesce when irradiated by a primary light source. Independent claim 36, from which claims 37-39 and 44 depend directly or indirectly, recites a prepolymer composition, comprising a precursor material capable of being reacted to form a solid host matrix, and a population of QDs disposed in the precursor material. Independent claim 46, from which claims 47, 49, 52, 56, 61, 68 and 69 depend directly or indirectly, recites a method of producing light of a desired color. The method includes providing a population of QDs having a desired size distribution and a surface adapted to allow dispersion in a host matrix, dispersion of these QDs in the host matrix, and illumination of the host matrix in order to allow the QDs to photoluminesce. Each of these claims has been amended herein to clarify that the QDs are dispersed without substantial flocculation.

Hakimi does not enable one of ordinary skill in the art to make a host matrix or prepolymer having QDs dispersed throughout the bulk without substantial flocculation in a matrix. The entirety of Hakimi’s disclosure of how the quantum dots are disposed in the matrix is the single statement, “Disposed in host material 12 are a multiplicity of quantum dots 14 made of cadmium selenide which fluoresces at 550 nm.” (col. 3, lines 34-36) As discussed at length in the present application, the dispersal of QDs through a matrix without substantial flocculation requires significant attention to the chemistry of the surface layer of the dots (p. 15, lines 18-29; Examples). Thus, the very limited disclosure of Hakimi would not allow one of ordinary skill in the art to prepare a host matrix having a population of QDs dispersed therein, as recited in claim 27. Further, there is no discussion or suggestion whatsoever in Hakimi of a prepolymer, let alone a prepolymer having QDs dispersed therein, as recited in claim 36. For at least this reason, Applicants respectfully submit that Hakimi does not anticipate claims 27, 28, 30, 31, 35-39, 44,

46, 47, 49, 52, 56, 61, 68 and 69. Reconsideration and withdrawal of the rejection is therefore requested.

#### Rejections under 35 U.S.C. § 103

Claims 5, 10-12, 29, 32-34, 40-43, and 57-60 stand rejected under 35 U.S.C. § 103(a) as obvious over Hakimi in view of Bawendi. This rejection is respectfully traversed for the reasons set forth below.

Claims 5 and 10-12 depend directly or indirectly from claim 1, discussed above. These dependent claims recite coats on QDs which are incorporated into the device of claim 1.

As discussed above, Hakimi does not describe or suggest both primary and secondary light passing *through* a matrix as recited by claim 1. This defect is not remedied by Bawendi, which does not describe a host matrix at all. In addition, neither Hakimi nor Bawendi describes the coats recited in claims 10-12, which comprise materials having an affinity for the host matrix. For at least these reasons, Applicants respectfully submit that claims 5 and 10-12 are not obvious over Hakimi in view of Bawendi. Reconsideration and withdrawal of the rejection is therefore respectfully requested.

Claims 29 and 32-34 depend directly or indirectly from claim 27, discussed above. These dependent claims recite coats on QDs which are incorporated into the composition of claim 27.

As discussed above, Hakimi does not enable one of ordinary skill in the art to make a population of QDs dispersed in a host matrix without substantial flocculation, as recited by claim 27 (amended). This defect is not remedied by Bawendi, which does not describe a host matrix at all. In addition, neither Hakimi nor Bawendi describes the coats recited in claims 32-34, which comprise materials having an affinity for the host matrix. For at least these reasons, Applicants respectfully submit that claims 29 and 32-34 are not obvious over Hakimi in view of Bawendi. Reconsideration and withdrawal of the rejection is therefore respectfully requested.

Claims 40-43 depend directly or indirectly from claim 36, discussed above. These dependent claims recite coats on QDs which are incorporated into the prepolymer composition of claim 36.

As discussed above, Hakimi does not enable one of ordinary skill in the art to make a population of QDs dispersed in a precursor material without substantial flocculation, as recited by claim 36 (amended). This defect is not remedied by Bawendi, which does not describe a precursor material at all. In addition, neither Hakimi nor Bawendi describes the coats recited in claims 41-43, which comprise materials having an affinity for the host matrix. For at least these reasons, Applicants respectfully submit that claims 40-43 are not obvious over Hakimi in view of Bawendi. Reconsideration and withdrawal of the rejection is therefore respectfully requested.

Claims 57-60 depend directly or indirectly from claim 46, discussed above. These dependent claims recite additional steps of depositing coats on QDs, which are dispersed in a host matrix without substantial flocculation as recited in claim 46.

As discussed above, Hakimi does not describe a method of dispersing a population of QDs in a host matrix without substantial flocculation, as recited by claim 46. This defect is not remedied by Bawendi, which does not describe a host matrix at all. In addition, neither Hakimi nor Bawendi describes the coats recited in claims 59 and 60, which comprise materials having an affinity for the host matrix. For at least these reasons, Applicants respectfully submit that claims 57-60 are not obvious over Hakimi in view of Bawendi. Reconsideration and withdrawal of the rejection is therefore respectfully requested.

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Respectfully submitted,



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